VERESHCHAGIN, L.F., doktor fiziko-matematicheskikh nauk; ZHAVORONKOV, N.M., redaktor; VOLODINA, N.I., redaktor; POLYAKOVA, T.V., tekhnicheskiy redaktor

[High pressure in the technology of the future] Vysokie davleniia v tekhnike budushchego Moskva, Izd-vo Akademii nauk SSSR, 1956. 35 p. (MIRA 9:3)

1. Chlen-korrespondent AN SSSR (for Zhavoronkov)
(Pressure (Physics))

ZHAVORONIKOV, N.M.

CARD 1 / 2 PA - 1520

SUBJECT USSR / PHYSICS
AUTHOR SEVRJUGOVA,N.N., UVAROV,O.V., ŽAVORONIKOV,N.M.
TITLE The Determination of the Separation Coefficients of Boron Isotopes at equilibrium Evaporation of BCl_3.

PERIODICAL Atomnaja Energija, 1, fasc.4, 113-116 (1956)
Issued: 19.10.1956

The present work describes the exact determination of the separation coefficient α of the system $B^{11}Cl_3 - B^{10}Cl_3$ and of its temperature dependence by the method of RALEIGH'S distillation. With this method a large quantity of the substance to be investigated is evaporated with the exception of a small remainder, and α is then determined from the modification of isotopic conditions at the beginning and at the end of the process of distillation. Distillation took place in two stages. The determination of the separation coefficient is possible if the following conditions are satisfied: The composition of the liquid must always remain unchanged in the entire volume. Evaporation must be slow without any violent boiling. The walls, particularly above the liquid, must always be a little warmer than the liquid. The first stage of distillation extends from 2000-3000 g to 50-70 g. The distilling device is described on the basis of a drawing. After this evaporation the metal balloon was removed and replaced by the evaporator for the second stage.
Also the apparatus for the second stage of distillation is illustrated by a drawing. This second distillation was carried out under the same conditions as

the first, and 0,5 to 1,0 g of the liquid was left over in the evaporator. This remainder of liquid was carefully and exactly weighed. The samples were filled into glass ampules which were fitted to the evaporator. On the occasion of the introduction of the evaporator into the DEWAR vessel with liquid air, the air was pumped out. The evaporator was then heated to room temperature and in the ampule about 0,3 g BCl_3 were condensed. Also a second ampule was filled in the same manner.

At 300 revolutions performed by the vanewheel-like mixing device α attains its maximum value.

By means of the same apparatus the influence exercised by the evaporation velocity on the separation coefficient of $B^{10}Cl_3$-$B^{11}Cl_3$ was investigated. In the interval of evaporation velocities of from 1,8 to 4,7 cm^3/cm^2.hour this amount remained practically constant. With rising temperature α decreases considerably. At -61,7° the vapors of $B^{10}Cl_3$ and $B^{11}Cl_3$ have the same viscosity, but at lower temperatures the viscosity of $B^{10}Cl_3$ is lower than that of $B^{11}Cl_3$. This dependence can be represented by the equation $\alpha=1,1112.e^{-2,33/T}$. According to a mass-spectroscopic analysis of isotopes of the compound BCl_3 the ratio of isotopes in the initial state is 4,11. This corresponds to the following concentration: B^{10} - 19,5%, B^{11} - 80,5%.

INSTITUTION:

ZHAVORONKOV, N.M.

"K. A. Timiryazev and the Nitrogen Problem," by N. M. Zhavoronkov, Corresponding Member Academy of Sciences USSR, Khimicheskaya Nauka i Promyshlennost', Vol 1, No 6, Nov/Dec 56 (published Feb 57), pp 606-609

After reviewing Timiryazev's work on nitrogen fertilizers and their use in agriculture, the author discusses the technical and economic aspects of the fixed nitrogen industry in the USSR. He concludes, that in searching for new methods of nitrogen fixation, "one must not neglect the possibilities opened in this field by the availability of nuclear energy: it would be desirable to find ways of applying nuclear energy directly for the purpose of conducting chemical reactions, particularly as far as nitrogen fixation is concerned." He discusses the experimental work done on the subject, as follows:

"Experiments conducted by S. Ya. Pshezhetskiy at the Institute of Physical Chemistry imeni L. Ya. Karpov have shown that as a result of the action on liquid air or air in the gaseous state of rapid electrons or of gamma-radiation emitted by cobalt, direct formation of nitrogen oxides takes place.

SUM. 1360

"An extensive investigation completed recently by P. Harteck and S. Dondes and described in Nucleonics, No 7, 1956, p 22, in the course of which nitrogen-oxygen mixtures were irradiated directly in the Brookhaven nuclear reactor, has shown that considerable yields of nitrogen oxides can be obtained by this means. The results obtained indicate that this process is feasible from the industrial standpoint. Apparently the fixation of nitrogen is one of the most promising ways of applying nuclear energy for peaceful purposes, to which the attention of scientists and engineers will be necessarily attracted." (U)

SUM.1360

ZHAVORONKOV, N.M.

UVAROV, O.V.; SOKOL'SKIY, V.A.; ZHAVORONKOV, N.M.

Fractionating column for the production of heavy oxygen water. Khim. prom.no.7:404-405 O-N '56. (MLRA 10:1)

1. Nauchno-issledovatel'skiy fiziko-khimicheksiy institut imeni L.Ya. Karpova.

(Distillation apparatus) (Water) (Oxygen)

SOV/124-58-1-834

Translation from: Referativnyy zhurnal, Mekhanika, 1958, Nr 1, p 109 (USSR)

AUTHORS: Zhavoronkov, N. M., Nikolayev, A. M.

TITLE: Determination of the Eddy Viscosity of a Turbulent Flow in a Rectangular Channel (Opredeleniye vikhrevoy vyazkosti turbulentnogo potoka v kanale pryamougol'nogo secheniya)

PERIODICAL: Tr. Kazansk. khim.-tekhnol. in-ta, 1956, Nr 21, pp 177-193

ABSTRACT: In order to investigate the distribution of the mean velocities over the cross section of a rectangular channel, the authors divide the flow into three zones, namely, a laminar sublayer, an intermediate layer, and a turbulent core. Formulas are obtained for the velocity distribution and for the turbulent viscosity coefficients in the above-mentioned three zones of the flow. Bibliography: 6 references.

Ye. M. Minskiy

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B-7

B-7

ZHAVORONKOV, N.M.

USSR/Physical Chemistry. Isotopes.

Abs Jour : Ref Zhur - Khimiya, No 7, 1957, 22218

Author : V. Yu. Orlov, N. M. Zhavoronkov.
Inst : Not given
Title : About the separation of silicon isotopes by method of $SiCl_4$ rectification.

Orig Pub : Zh. Prikl. Khimii, 1956, 29 No 6, 959-960.

Abstract : The separation of isotopes Si^{28} Si^{29} and Si^{30} was studied by method of $SiCl_4$ rectification in a glass column 1.5m. high and an inner diameter of 25mm with a nozzle made of coils of 2x2mm diam(wire made of stainless steel of 0.2mm diam) at 57±10 and at atmospheric pressure. In the upper part of the column were separated samples of $SiCl_4$ which was transformed into SiF_4 and was subjected to mass-spectrometric analysis. The isotopic composition of the standard samples of Si thus obtained (Si^{26} 92.16 ± 0.04; Si^{29} 4.70 ± 0.02; Si^{30} 3.14 ± 0.02%) is in conformity with that obtained before (R.Zh.Khim.1954, 35621) After 12 days of incessant work of the column, the enrichment Q (equal to the relation of average isotopic relations for alternately measured standard and enriched samples) was: Q_1 =

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APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R002064610012-9

USSR/Physical Chemistry. Isotopes.

B-7

Abs Jour : Ref Zhur - Khimiya, No 7, 1957, 22218

$R_1(st)/R_1(sa)$ = 1.001 ± 0.004 and $Q_2 = R_2(st)/R_2(sa)$ = 1.007 ± 0.002($R_1 = I_{85}/I_{86}$, $R2 = I_{85}/I_{87}$, I- is the ion cluster intensity of SiF_3^+ with the masses of 85, 86 and 87) an indication that the use of this method is purposeless.

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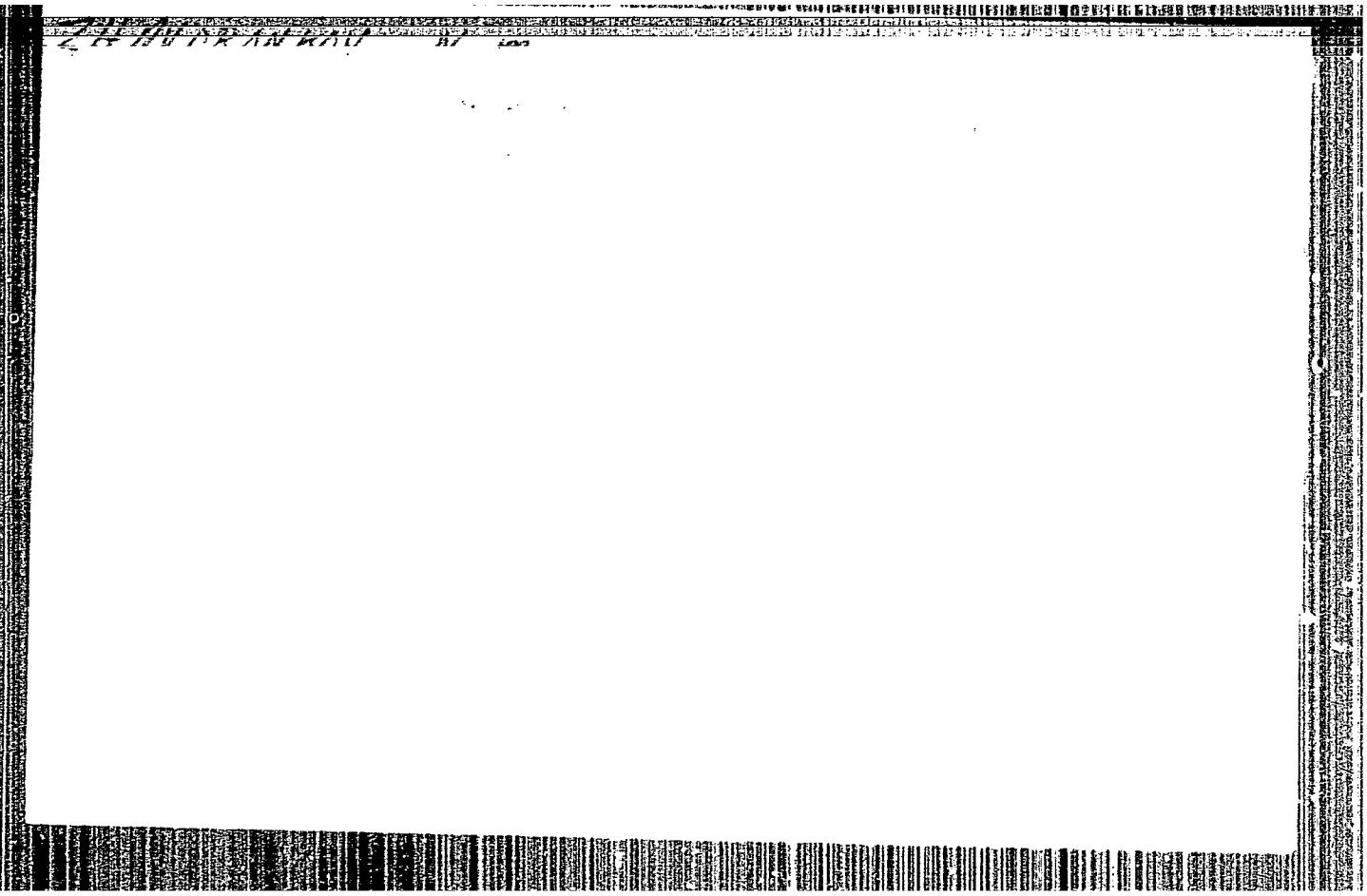


APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R002064610012-9"

ZHAVORONKOV, N. M.

USSR/Chemistry - Chemical technology

Card 1/1 Pub. 22 - 26/43

Authors : Malyusov, V. A.; Umnik, N. N.; and Zhavoronkov, N. M., Memb. Corr., AN SSSR

Title : Rectification in columns with a rotating rotor

Periodical : Dok. AN SSSR 106/1, 99-102, Jan 1, 1956

Abstract : The effect of basic rectification factors - rate of rotor rotation, rate of flow, physico-chemical properties of the mixture and geometric duct dimensions - on the rate of mass exchange in rectification columns was investigated with such mixtures as benzene-di[illegible]roethane, benzene-carbon tetrachloride, chlorobenzene-[illegible]ene a[illegible]-water. The results obtained are given [illegible]s. Ten [illegible]R, 5 eng., and 2 USA (1938-1955). Table; [illegible].

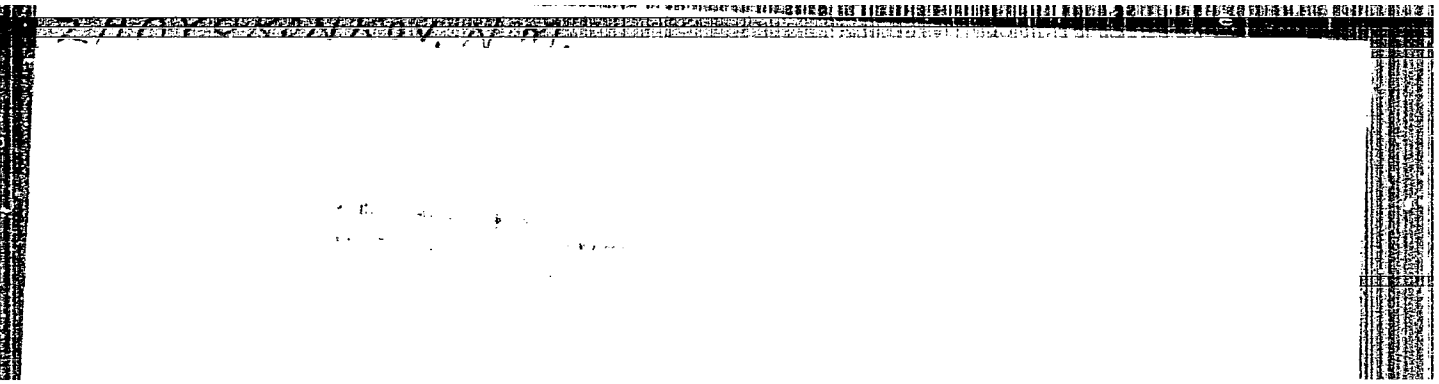
Institution : Scient. Res. Physicochemical Inst. im. L. Ya. Karpov

Submitted : July 1, 1955

BABKOV, S.I.; ZHAVORONKOV, N.M.

Kinetics of multistage processes of separation of binary mixtures. Velocity of approach to the steady state. Dokl.AN SSSR 106 no.5:877-880 F '56. (MLRA 9:7)

1.Chlen-korrespondent AN SSSR (for Zhavoronkov).2.Nauchno-issledovatel'skiy fiziko-khimicheskiy institut imeni L.Ya.Karpova.
(Distillation, Fractional)



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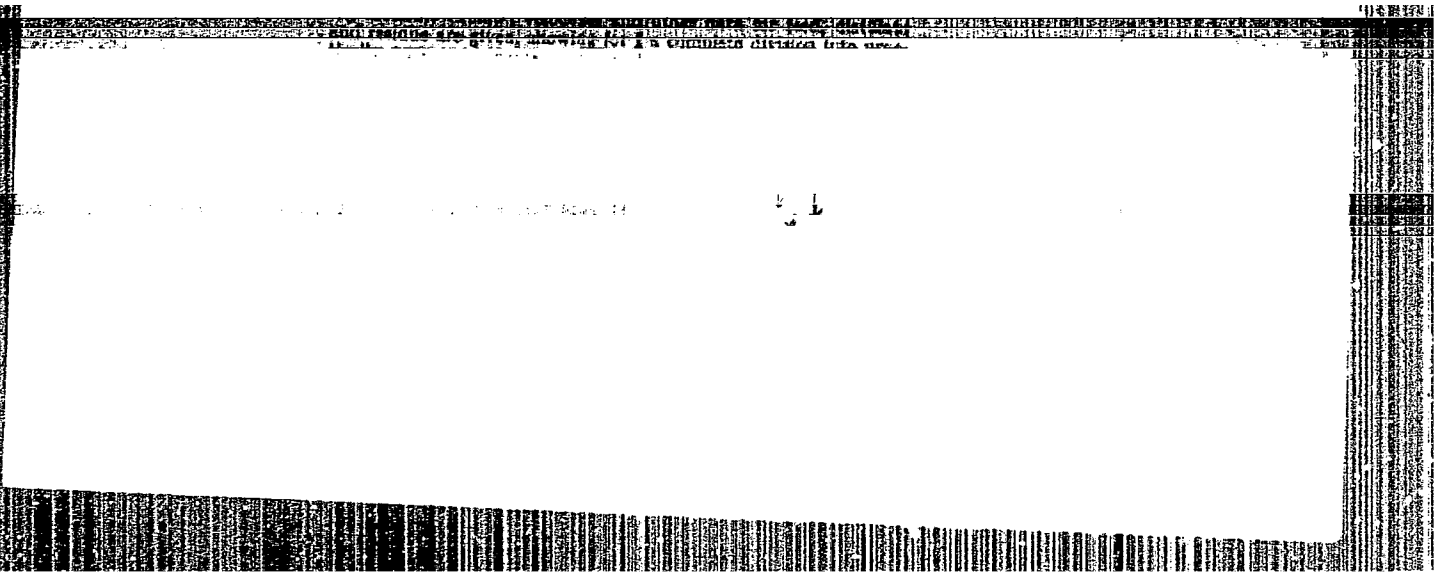

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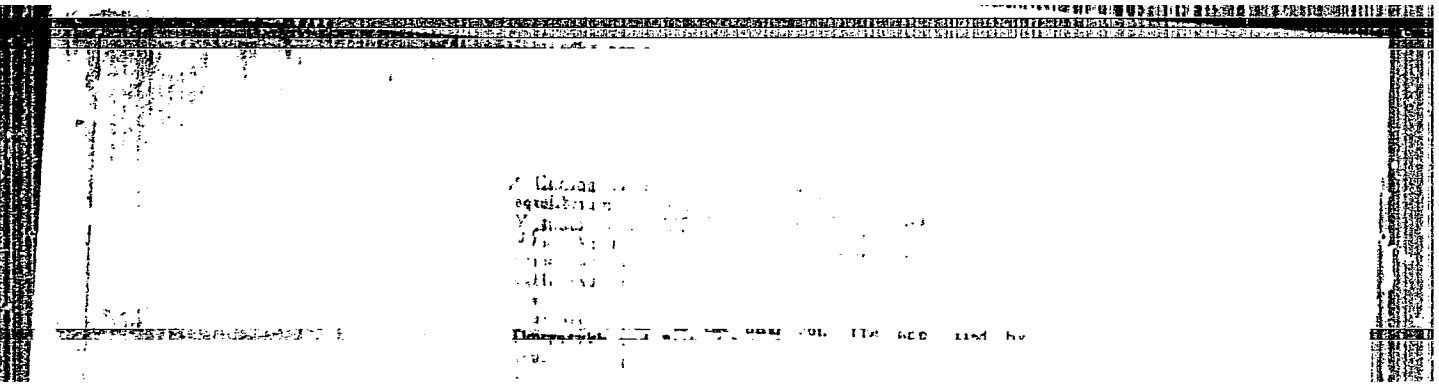

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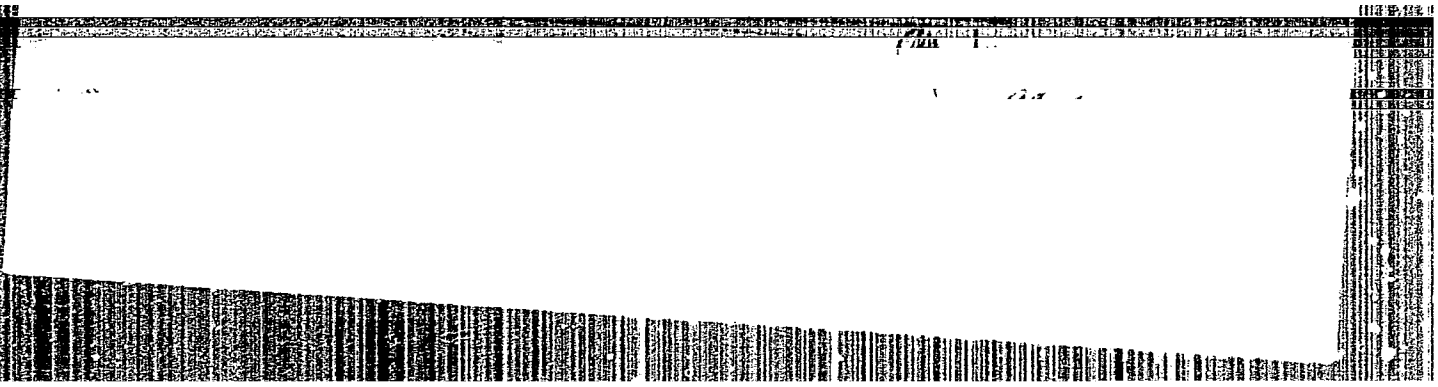
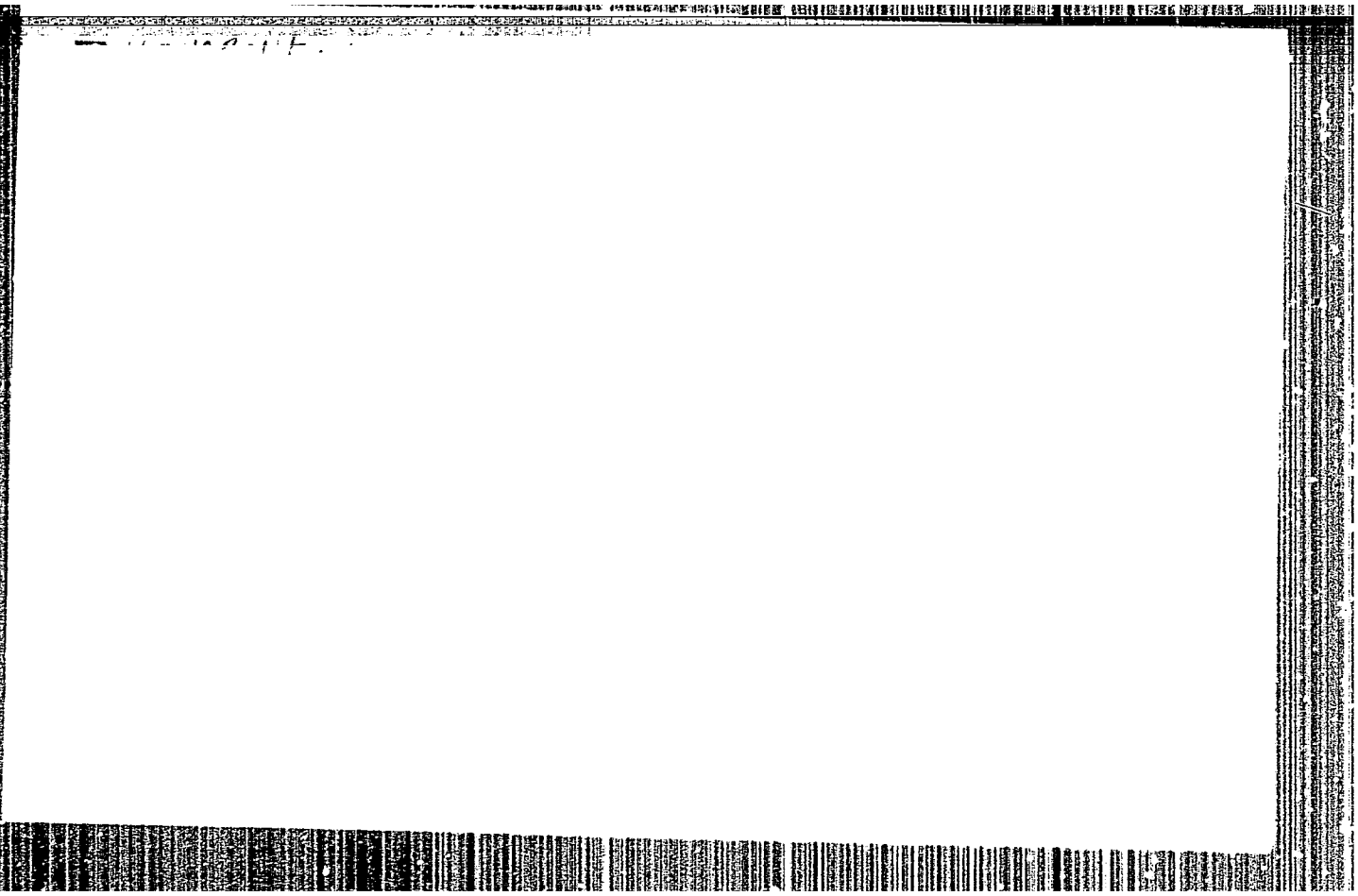


APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R002064610012-9"

ZHAVORONKOV, N.M. (Prof.)

"The Process of Steady and Unsteady Mass Transport in the Absorption and Rectification."

report presented at Scientific Conference at the Inst. for Physical Chemistry imeni L. Ya. Karpov, Acad. Sci. USSR, Nov 1957.



AUTHOR: Zhavoronkov, N. M. 62-11-1/29

TITLE: Chemical Industry and Science of the USSR (Khimicheskaya promyshlennost' i nauka SSSR).

PERIODICAL: Izvestiya AN SSSR, Otdel. Khim. Nauk, 1957, Nr 11 pp. 1277-1283 (USSR)

ABSTRACT: Here a survey on the development during the last 40 years is given. There are the following important occurrences: apatite in Khibing on the peninsula of Kola, phosphorite in the Kara-Tau mountains in the Kazakh SSR, practically inexhaustible occurrences of potash salts in the region of Solikamsk and Berezniki in northern Ural, on the basis of which an extensive potash fertilizer industry was founded. In 1956 the production of mineral fertilizers (phosphate, potash and nitrogen fertilizers) amounted to 10.9 million tons. In 1956 in the USSR 4.3 million t of sulphuric acid, 631.0 thousand t of caustic soda, 1.545 thousand t of calcined soda, 77.0 thousand t of organic colouring substances, 24.9 million t of cement, 46.6 million t of cinder was produced. With regard to the chemical industry on the whole, USSR occupies the second place in the world after the

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USA. An own chemical machine construction has been developped. The following research institutes are existing: Physico-chemical institute imeni Karpova, scientific research institute for fertilizers and insecticides State Institute for applied chemistry, State Institute for nitrogen industry, Allunion scientifical research institute for mineral raw materials (VIMS), scientifical research institute for organic intermediate products and colouring substances, institute for pure reagents, synthetic rubber, rubber industry, tire industry, plastics, synthetic alcohols, artificial fiber. mining chemistry, soda industry, lacquers and colour industry, glasses, spun glass, cement, building and electrotechnical industry, chemical machine construction, oxygen machine construction, as well as a number of institutes for projecting operations of the chemical industry and an extensive network of factory laboratories. A survey on the most important research papers carried out in the domain of chemistry is following: Member of the Academy N. S. Kurnakov developped the chemistry and technology of natural salts and of alloys, M. I. Il'inskiy, A. Ye. Poray-Koshits and N. N. Vorozhtsov decisively take part in the development of the industry of intermediate products, colouring substances and

other complicated organic preparations. The investigations of A. N. Bakh and his school are the fundament for the creation of vitamine production. The papers of A. Ye. Favorskiy founded the acetylene chemistry, member of the Academy N. N. Semenov in 1956 received the Nobel prize, the papers of S. V. Lebedev served for the synthesis of caoutchouc, in 1932 in the USSR the first large plant for artificial caoutchouc production, the first one in the world, was set into operation, P. G. Sergeyev and R. Yu. Udris showed new methods for producing phenol, the papers of R. Yu. Udris on the synthesis of methyl-styrol were of great importance, the papers on obtaining aniline by the method of restoration of nitrobenzene by catalysis were important. The process of gasification of brown coal, peat etc. worked out in the industrial range is of great importance. The first industry aggregate GIAP - 1 for small-grained fractions (0-12 mm) coal was set into operation in the electrochemical combination of Chirchik in February 1950. A number of such aggregations at present is in action in the USSR, Bulgaria and China. From 1948 to 1951 a process for

producing an ultra-solid stone on the basis of fine grinded corundum was developped.

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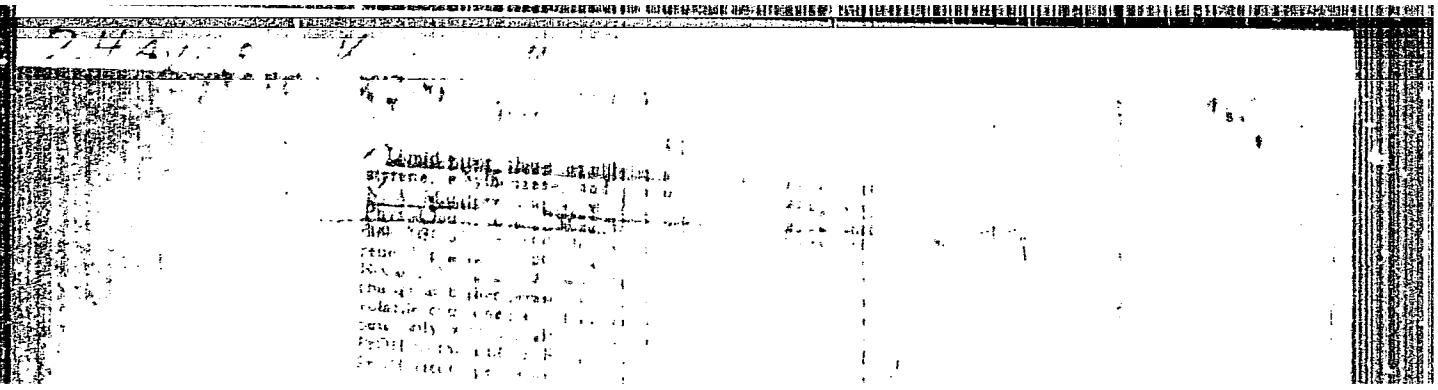

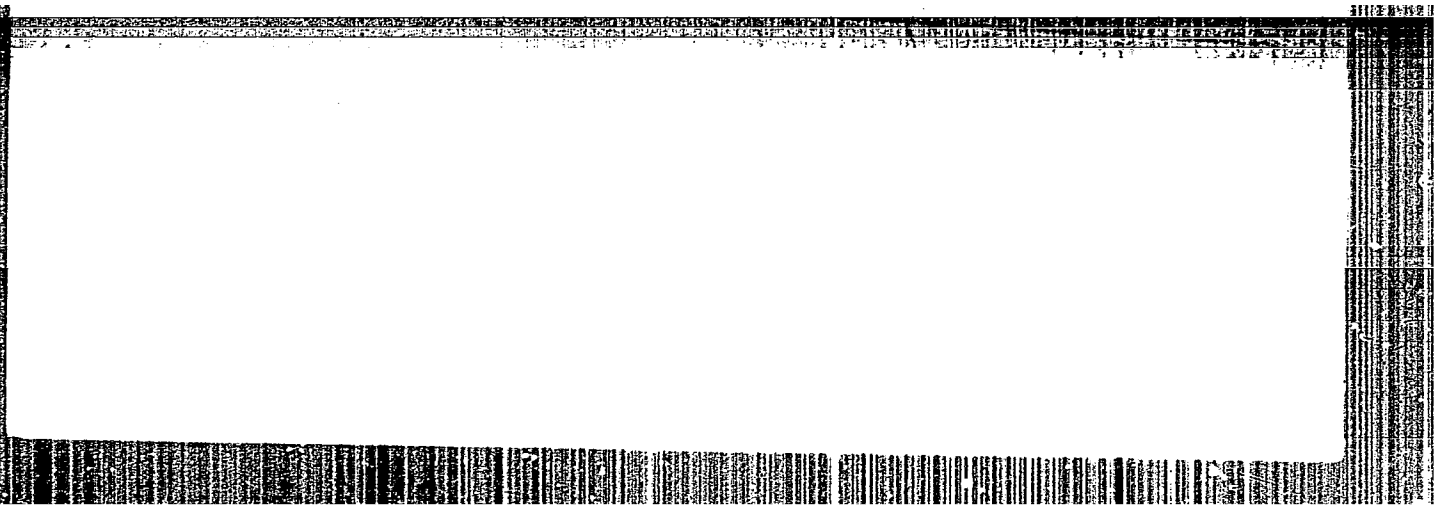

APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R002064610012-9"

ZHAVORONKOV, N.M.

AUTHORS: Malyusov, V. A., Malofeyev, N. A., and Zhavoronkov, N. M., Corresponding Member of the AN USSR 20-4-36/51

TITLE: On the Coefficient of the Separation of Mixtures Under High Vacuum Evaporation (O koeffitsiyente razdeleniya smesey pri isparenii v vysokom vakuume)

PERIODICAL: Doklady AN SSSR, 1957, Vol. 116, Nr 4, pp. 660 - 663 (USSR)

ABSTRACT: The evaporation process in high vacuum can take place under equilibrium conditions, if all molecules return finally into the liquid phase after their separation from the evaporation surface in consequence of recoiling from the walls of the closed vessel and by the mutual collision;or, however, if all molecules reach the condensation surface and do not return. There is, however, in the molecular destillation a widely distributed case, when the length of the free path of the molecules (λ) is shorter than the distance between the condenser and the evaporator (h). Here a certain part of the evaporated molecules suffers a series of collisions on their way to the condenser and a portion of them returns to the evaporation surface. In the case of a considerable rise of temperature the length of the free path of the evaporated molecules decreases rapidly and the molecules move chaotically in the space betwee[illegible] evaporator and the condenser. Thus every

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molecule has the same possibility of getting on either- the condenser- or the evaporation surface if these surfaces are equally great. In this case evaporation conditions occur which are similar to the equilibrium ones. They differ from the latter only by the fact that the evaporation takes place with a noticeable velocity, and the vapors can be seen as a destillate flowing down from the condenser. Formulae are given for ideal binary mixtures (Raoul Law) and for real mixtures. The relation derivated for ideal as well as for real mixtures according to various computations lacks at present sufficient data as to be considered as established. The values α_M and α_p for the system di-2-ethyl--hexyl-phthalat- di-2-ethylexyl-sebacinate (in the further course abbreviated: EHPh and EHS) were measured by Khikman and Trevoy (quotation 1).The results of their investigations do,however, not confirm the relation (8). The authors have measured the values α_M and α_p for the system dibutyl-phthalat- dibutyl-"aselaat" (DBPh and DBA) between 6o and 12o°. Figure 1 gives the experimental results of a 5o% -mixture of these substances in dependence on the temperature. Here the results are not contradicting to the theory. As the results did not correspond to those of Hickman and Trevoy, the authors investigated the EHPh -EHS-mixture. The results given in figure 3 and 4 are closely agreeing to

those of Khikman and Trevoy for α_M are, however, somewhat deeper for α_p. The authors are not able to explain these divergencies, except that in the case of Khikman and Trevoy a partial rectification took place. Figure 4 gives the dependence of α_M and α_p on the temperature. It is necessary to complete the method of measuring of the coefficients of separation. Nevertheless the results obtained in this paper are a confirmation of the rightness of the relation (8) at lower temperatures and of the fact that the relation α_M/α_p approaches the value 1 with the rise of temperature. There are 4 figures, and 5 references, 2 of which are Slavic.

ASSOCIATION: Physical-Chemical Institute imeni L. Ya. Karpov (Fiziko-khimicheskiy institut im. L. Ya. Karpova)

SUBMITTED: May 3o, 1957

AVAILABLE: Library of Congress

ZHAVORONKOV, N.M.

20-4-36/52

AUTHORS: Konobeyev, B. I., Malyusov, V. A., and Zhavoronkov, N. M., Corresponding Member of the AN USSR

TITLE: Mass Exchange in Thin Liquid Films (Massoobmen v tonkikh plenkakh zhidkosti).

PERIODICAL: Doklady AN SSSR, 1957, Vol. 117, Nr 4, pp. 671-674 (USSR)

ABSTRACT: In some treatises (references 1-5) it has been proved that the absorption speed of hardly soluble gases in tubes and drains with wetted walls at little gas speeds (0,1-6 meters per second) is independent of these speeds. The absorption speed is only determined by the resistance of the mass delivery in the liquid phase. The treatise discussed here gives the results of the absorption of CO_2 by water in vertical tubes at high gas speed, and with rising and falling liquid currents. From the data in figure 1 and 2 we can conclude that the gas speed strongly influences the absorption speed in falling liquid current. With rising liquid current there is only little influence, and with gas speeds of 11,5 to 39,0 meters per second it is rather limited. The authors suppose that the absorption speed of

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hardly soluble gases in a filmy ("plenochnyy") current only depends on the conditions of the formation of waves, especially on the length of the waves λ and on their amplitude ("amplituda"). The wave length was experimantally stated means of 2 methods: 1) by direct light absorption of the liquid current in the tube, and 2) by light absorptions from the oscillograph. In this last case the flowing liquid film connected a circuit that included a source of current and a constant resistance of 50 000 ohms. The alternating component ("peremennaya sostavlyaushchaya") of the voltage that had arisen because of the changes of the thickness of the liquid layer, was transferred to the entrance of the oscillograph by the constant resistance. Table 1 shows the results of the experimental determinations of the wave length. Two equations, for rising and for falling liquids, are given. The first is exact enough as the correspondance of the results obtained by experiments to those obtained by calculation is satisfactory. For the determination of the amplitude ("amplituda") of the wave profile the electric resistance of the liquid film, dependent on its surface curvature, was used. Figure 3 shows the results of the measuring of the amp[illegible]de dependent on the gas speed in

rising and falling liquid current. In the first case the amplitude varies from 0,86 to 0,48, in the last case it is constant and amounts to 0,46. With both directions of the current it is independent of the current speed. Figure 4A shows experimental results on the dependence of the absorption coefficients of CO_2 by water on the wave length and on the amplitude of the rising and falling current. The coefficients of the mass exchange are dependent on the wave length and the amplitude. The data on the mass exchange can be placed satisfactorily within a curve if it is assumed that the mass exchange coefficients are proportional to the square of the amplitudes with any (fixed) value of the wave length. Finally the possibilities of calculating the CO_2 absorption coefficient by water, the wave length, and the thickness of the liquid film, are given.
There are 4 figures, 1 table, and 11 references, 9 of which are Slavic.

Mass Exchange in Thin Liquid Films

20-4-36/52

ASSOCIATION: Scientific Institute for Physical-Chemical Research imeni L. Ya. Karpov (Nauchno-issledovatel'skiy fiziko-khimicheskiy institut im. L. Ya. Karpova).

SUBMITTED: July 3, 1957

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5(2) PHASE I BOOK EXPLOITATION SOV/1916

Vsesoyuznoye soveshchaniye po khimii bora, 1955

Bor; trudy Konferentsii po khimii bora i yego soyedineniy (Boron; Transactions of the Conference on the Chemistry of Boron and Its Compounds) Moscow, Goskhimizdat, 1958. 189 p. Errata slip inserted. 2,400 copies printed.

Ed.: G.P. Luchinskiy; Tech. Ed.: M.S. Lur'ye.

PURPOSE: This book is intended for chemists, as well as for industrial personnel working with boron and its compounds.

COVERAGE: This collection contains 24 studies on the chemistry, crystalline structure, physicochemical properties, and technology of boron and its compounds. Twenty-two of the studies were presented at the All-Union Conference on Boron Chemistry, held at the Nauchno-issledovatel'skiy fiziko-khimicheskiy institut im. L. Ya. Karpova (Scientific Research Physicochemical Institute im. L. Ya. Karpov) in

~~Boron: Transactions of the Conference (Cont.) SOV/1916~~

December 1955. Two of these articles deal with the thermochemistry of boron. The two studies on "borundum" production are being published for the first time. The studies are well illustrated and accompanied by bibliographies.

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Zhavoronkov, N.M.

PHASE I BOOK EXPLOITATION SOV/1297

Vsesoyuznaya nauchno-tekhnicheskaya konferentsiya po primeneniyu radioaktivnykh i stabil'nykh izotopov i izlucheniy v narodnom khozyaystve i nauke, Moscow, 1957

Polucheniye izotopov. Moshchnyye gamma-ustanovki. Radiometriya i dozimetriya; trudy konferentsii... (Isotope Production. High-energy Gamma-Radiation Facilities. Radiometry and Dosimetry; Transactions of the All-Union Conference on the Use of Radioactive and Stable Isotopes and Radiation in the National Economy and Science) Moscow, Izd-vo AN SSSR, 1958. 293 p. 5,000 copies printed.

Sponsoring Agency: Akademiya nauk SSSR; Glavnoye upravleniye po ispol'zovaniyu atomnoy energii SSSR.

Editorial Board: Frolov, Yu.S. (Resp. Ed.), Zhavoronkov, N.M. (Deputy Resp. Ed.), Aglintsev, K.K., Alekseyev, B.A., Bochkarev, V.V., Leshchinskiy, N.I., Malkov, T.P., Sinitsyn, V.I., and Popova, G.L. (Secretary); Tech. Ed.: Novichkov, N.D.

PURPOSE: This collection is published for scientists, technologists, persons engaged in medicine or medical research, and others concerned with the production and/or use of radioactive and stable isotopes and radiation.

COVERAGE: Thirty-eight reports are included in this collection under three main subject divisions: 1) production of isotopes 2) high-energy gamma-radiation facilities, and 3) radiometry and dosimetry.

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PART I. PRODUCTION OF ISOTOPES

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APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R002064610012-9"

ZHAVORONKOV, N. aon UVAROV, O.

"Separation of Stable Isotopes of Light Elements."

paper to be presented at the 2nd UN Intl. Conf. on the preaceful uses of Atomic Energy, Geneva, 1 - 13 Sept 58.

ZHAVORONKOV, N. M.

AUTHORS: Malyusov, V. A., Malofeyev, N. A., Zhavoronkov, N. M. 64-1-7/19

TITLE: Investigations of the Distillation Process in a Molecular Still of the Centrifugal Type
(Issledovaniye protsessa distillyatsii v molekulyarnom kube tsentrobezhnogo tipa)

PERIODICAL: Khimicheskaya Promyshlennost', 1958, Nr 1, pp. 31-36 (USSR).

ABSTRACT: Investigations were carried out in a laboratory molecular centrifugal distilling still with a conical rotor. A mixture of di-2-ethylhexyl-phthalate (EGF) and di-2-ethylhexylsebacinate (EGS) was used. The distribution coefficient of the mixture is independent of the composition in the case of a nonequilibrium vaporization and depends only on temperature. The investigations of the temperature influence and of the charging on the distillation temperature have shown that in the last case at temperatures up to 125°C somewhat higher results are obtained than were expected according to the computation. This is assumed to be due to a splashing of the liquid on the rotor during the destillation, and not to faulty design. The thereby produced error is given with approximatively 0,2 and a correcting formula is given for the

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computation of the distillation velocity. The formula according to Burrows (reference 12) is used, whereby a satisfactory agreement is obtained. Investigations of the distribution effect showed that at increased temperature the output of the apparatus decreases which seems to be due to the increased vaporization velocity and the diffusion of the more volatile EGF from the liquid centre. The output amounts e. g. to 0,75 at 134°C. The distillation velocity is computed according to a modified computation formula of Carman (reference 14), whereby the influence of inert gases is taken into account. It was found that an improvement of the distillation process is obtained by the reduction of the vacuum, since the splashing of the distillate is reduced as well. Some formulae for the practical computations of the apparatus of the centrifugal type are given.
There are 9 figures, and 15 references, 7 of which are Slavic.

AVAILABLE: Library of Congress.

Card 2/2

1. Molecular distilling plants-Centrifugal-Test results
2. Distilling plants-Test results 3. Distilling plants-Laboratory

AUTHORS: Zhavoronkov, N. M., Malyusov, V. A. SOV/156-58-1-45/46

TITLE: Investigation and Calculation of Absorption and Rectifying Columns With Regular Filling Material (Issledovaniye i raschet absorbtsionnykh i rektifikatsionnykh kolonn s regulyarnoy nasadkoy)

PERIODICAL: Nauchnyye doklady vysshey shkoly, Khimiya i khimicheskaya tekhnologiya, 1958, Nr 1, pp. 185 - 192 (USSR)

ABSTRACT: As is well known, the columns mentioned in the title have as a feature a high throughput rate and a low hydraulic resistance. Their investigation, as well as the development of an economical design, would therefore be of great practical interest. A survey of literature is given (Refs 1-5). In cooperation with Malofeyev, Umnik, Babkov and Uvarov (Refs 6-10) the authors have concerned themselves with designing distribution equipment of low hydraulic resistance. Among this equipment, 4 types (and 3 subtypes) of vertical columns were studied (Figs 1a - g). Figure 2 gives the schematic design of a column (500 mm diam., 18 m height) filled with packings of sheet filling material. In order that all sheets may be moist[illegible] special grate distributors were arranged

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on the top packing. The main advantage of the filling material, its low hydraulic resistance, is illustrated in figure 3. The maximum load of the regular filling bodies can be computed from the graph, figure 5. Table 2 gives some rectification results obtained with the columns described. All experiments were made at pseudo-turbulent conditions (Re_r = 500 - 2000). For these, the height that would be equivalent to the theoretical plate was found to be almost independent of the load. For individual cases where the concentration of the component to be extracted is small (as, for instance, in producing the heavy oxygen and hydrogen isotopes) the use of the column will in fact permit installation of a multistage rectification. The condenser of the preceding column is used as an evaporating still for the next column whereby much steam is saved. The capacity of these columns was studied for the absorption of CO_2, and NH_4 respectively, in water, and of NH_4 in HCl (Refs 9,10). From this the partition coefficients in the liquid and gaseous phases could be determined. By ·dying packings of filling material of

Investigation and Calculation of Absorption and Rectifying Columns With Regular Filling Material

SOV/156-58-1-45/46

quite different values of equivalent diameter (the gaps between sheets being 5, 10, 20, and 30 mm) formulae for determining the partition coefficients of mass transfer were derived. There are 5 figures, 2 tables, and 15 references, 10 of which are Soviet.

ASSOCIATION: Kafedra tekhnologii svyazannogo azota i shchelochey Moskovskogo khimiko-tekhnologicheskogo instituta im.D.J.Mendeleyeva (Chair of Bound Nitrogen and Alkali Technology of the Chemical Engineering Institute imeni D.I.Mendeleyev,Moscow)

SUBMITTED: October 10, 1957

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SOV/156-58-3-51/52

AUTHORS: Sakodynskiy, K. I., Babkov, S. I., Zhavoronkov, N. M.

TITLE: Two-Temperature Method for the Separation of Binary Mixtures (Dvukhtemperaturnyy metod razdeleniya binarnykh smesey)

PERIODICAL: Nauchnyye doklady vysshey shkoly, Khimiya i khimicheskaya tekhnologiya, 1958, Nr 3, pp. 598-602 (USSR)

ABSTRACT: In the present paper the most important rules governing the two-temperature method for the separation of binary mixtures are explained. The two-temperature method may be used successfully for the isotopic separation and for the absorption-desorption separation of gases. The conditions for carrying-out effective separations by means of the two-temperature method are given. The degree of elution φ in the two-temperature method is dependent on the temperature difference. An equation was formulated for the approximate determination of the number of theoretical stages necessary to obtain the separation desired. It was found that two separation columns are connected with each other by the two-temperature method and that they reach the same separation effect as can be

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Two-Temperature Method for the Separation of Binary Mixtures SOV/156-58-3-51/52

reached using a rectifying column with n number stages and the separation coefficient $\sqrt{\alpha_1/\alpha_2}$.

There are 2 figures and 5 references, 3 of which are Soviet.

ASSOCIATION: Kafedra tekhnologii svyazannogo azota i shchelochey Moskovskogo khimiko-tekhnologicheskogo instituta im. D. I. Mendeleyeva
(Chair for the Technology of Bound Nitrogen and Alkalies at the Moscow Chemical and Technological Institute imeni D. I. Mendeleyev)

SUBMITTED: October 28, 1957

Card 2/2

AUTHOR: Zhavoronkov, N. M., Corresponding Member, Academy of Sciences, USSR

SOV/156-58-4-1/49

TITLE: On the Forthcoming VIII Mendeleyev Congress (K predstoyashchemu VIII Mendeleyevskomu s"yezdu)

PERIODICAL: Nauchnyye doklady vysshey shkoly. Khimiya i khimicheskaya tekhnologiya, 1958, Nr 4, pp 613-616 (USSR)

ABSTRACT: In March 1959, the VIII Mendeleyev Congress for General and Applied Chemistry will take place in Moscow. The program of this congress comprises important problems of general and applied chemistry and is held in memory of the scientist Mendeleyev. 175 plenary reports on problems concerning the present stage of chemistry will be given at this congress. Basic chemical problems will be discussed. In the first plenary meeting A. N. Nesmeyanov, President of the Academy of Sciences, will hold a lecture on the "Periodic Law and Present Stage of Organic Chemistry". V. S. Fedorov, President of the State Committee of Chemistry at the Council of Ministers of the USSR, will deliver a lecture on new problems for the development of chemo-technological progress in economy. Under the supervision of well-known scientists more than 1250 reports and lectures on new investigations of

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theoretical and experimental problems will be delivered. Numerous papers will be submitted also by non-Soviet scientists, both from the Eastern bloc and from the West.

AUTHORS: Malyusov, V. A., Umnik, N. N., Zhavoronkov, N. M. SOV/64-58-5-9/21

TITLE: The Investigation and Calculation of Multistage Columns for Molecular Distillation (Issledovaniye i raschet mnogostupenchatykh kolonn dlya molekulyarnoy distillyatsii)

PERIODICAL: Khimicheskaya promyshlennost', 1958, Nr 5, pp. 296 - 302 (USSR)

ABSTRACT: Although several constructional designs for the above mentioned columns exist only those suggested by Brewer, Madorsky et al.(Bryuyer, Madorskiy) (Refs 1,2) as well as that of the authors mentioned above have been seriously studied. In the present paper the influence exerted by the distillation temperature and the high pressure on the degree of distribution, and the rates of evaporation and distillation were investigated. In the construction of the columns the principle suggested by Madorsky, Bradt and Straans (Madorskiy, Bredt i Shtraus)(Ref 2) was employed. A diagram of the constructional elements as well as a schematic representation of the arrangement are given. The authors worked with 5 columns of different stage numbers and investigated two

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binary systems, di-2-ethylhexyl-phthalate - di-2-ethylhexyl sebacinate and dibutylphthalate - dibutylacelainate. The degree of efficiency was calculated according to the equations given and the dimensions of the various sized columns were found to be an important factor here. The rate of evaporation was calculated according to the formula of Knudsen and Langmyur (Ref 4). Based on the results obtained the authors mention that there exists no influence of the pressure of the residual gases on the degree of efficiency. Experiments carried out to investigate the rate of distillation (the formula by Knudsen and Langmyur was used) showed that within the temperature range from 88 to 110° the quantity $1 - \gamma$ practically remains constant and is about 0,78. At increased distillation temperatures the coefficient f must be introduced into the formula of Borrouz. The applicability of the equation of Carman (Karman)(Refs 8,12) is also mentioned. The calculation of the number of ideal molecular plates (IMP) is carried out with the isothermal line $y^M = \psi(x)$ being used in the place of the obar $y^x = \varphi(x)$ in the graphical calculation at the y - x gram when the temperature of the mixture does

not change along the column. When the components of the mixture differ greatly by their properties and the temperature is different according to the stages of the column the IMP is calculated according to the line $y^M = f(x,T)$ with two possibilities existing for the line projection. There are 10 figures, 3 tables, and 12 references, 3 of which are Soviet.

1. Towers (Chemistry)--Performance 2. Phthlates--Evaporation
3. Gases--Pressure 4. Mathematics

SOV/63-3-6-18/43

AUTHOR: Zhavoronkov, N.M., Corresponding Member of the USSR Academy of Sciences

TITLE: Large Center of Chemical Science (Krupnyy tsentr khimicheskoy nauki) 40th Anniversary of the Foundation of the Physical-Chemical Institute Imeni L.Ya. Karpov (K 40-letiyu so dnya osnovaniya fiziko-khimicheskogo instituta imeni L.Ya. Karpova)

PERIODICAL: Khimicheskaya nauka i promyshlennost', 1958, Vol III, Nr 6, pp 813-814 (USSR)

ABSTRACT: The Physical-Chemical Institute Imeni L.Ya. Karpov has been founded at the end of 1918. Its first director was the Academician A.N. Bakh who headed the institute during 28 years. In 1930-32 several laboratories were separated from the institute and formed the base for other institutes, e.g. chemistry of coal and oil, artificial fibers, plastics, etc. A.N. Bakh investigated ferments and slow oxidation processes. Other investigations concerned the electric chemistry, the kinetics of oxidation reactions, the polymerization of hydrocarbons, etc. Several members of the institute were awarded the Stalin Prize: A.N. Bakh, A.N. Frumkin, P.I. Kazarnovskiy, G.P. Nikol'skiy, B.F. Ormont, N.G. Shafran, I.V. Petryanov,

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SOV/63-3-6-18/43

Large Center of Chemical Science. 40th Anniversary of the Foundation of the Physical-Chemical Institute Imeni L.Ya. Karpov

N.D. Rozenblyum, M.M. Faynberg, G.K. Borskov, Ya.K. Syrkin, V.A. Kargin, M.N. Shteding, E.Kh. Purshteyn, M.G. Slin'ko, S.S. Medvedev, S.D. Levina, K.A.Col'dberg, M.Ya. Kagan, K.A. Kocheshkov, N.M. Zhavoronkov, V.A.Malyusov. In the last 40 years more than 3,500 scientific works have been published by the institute. Now 2 academicians, 3 corresponding members of the USSR Academy of Sciences, 15 doctors and 90 candidates are working in the institute. There are 18 laboratories. Research is conducted in the fields: structure of polymers and production of polymers with given properties; scientific selection of catalysts; radiation-chemical processes; separation of mixtures; formation of aerosols. In the institute the most modern methods, like paramagnetic resonance, etc are used.

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5(3), 5(3)

AUTHORS: Malyusov, V. A., Malafeyev, N. A., Zhavoronkov, N. M. SOV/76-32-10-25/39

TITLE: The Determination of the Separation Coefficients of a Mixture of Dibutyl Phthalate and Dibutyl Azelate (Opredeleniye koeffitsiyentov razdeleniya smesi dibutilftalat-dibutilazelaat pri isparenii v vysokom vakuume)

PERIODICAL: Zhurnal fizicheskoy khimii, 1958, Vol 32, Nr 10, pp 2403 - 2409 (USSR)

ABSTRACT: I.V.Aristova participated in the experimental part of this work. Aside from the paper by Hickmann and Trevoy (Khikman and Trevoy) (Refs 1,2) there are at present no reliable data on temperature coefficients in high-vacuum. Apart from the data given by Williams (Vil'yams)(Ref 3) for an evaporation in equilibrium at 155° no determinations of separation coefficients of the mixture dibutyl phthalate (A) and dibutyl azelate (B) as a function of the composition versus the temperature have been carried out. This was done in the present case under the conditions of an evaporation both in equilibrium

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The Determination of the Separation Coefficients of a Mixture of Dibutyl Phthalate and Dibutyl Azelate

SOV/76-32-10-25/39

and not in equilibrium, in high-vacuum ($1 \cdot 10^{-4}$ torr). A tensiometer with "falling current" which supplies accurate data as mentioned by Hickmann and Trevoy (Ref 2) was used in the investigations with evaporation without equilibrium. The separation coefficients of the mixture (A)-(B) were determined at the temperatures 60,80, 100 and 110° and within a concentration range of 10 to 90 mol%(A). The coefficient decreases with the increase in temperature and an increase in the concentration of (A). An apparatus described by Hickmann and Trevoy (Ref 2) was used for the measurements in the evaporation in equilibrium. These experiments were carried out at 80, 100 and 120° at a concentration of 12,5 to 86 mol%(A). The same behaviour of the separation coefficient as in evaporations not in equilibrium was observed. A comparison of the coefficients of evaporation in equilibrium (α_p) with those not in equilibrium (α_m) showed that $\alpha_p < \alpha_m$ and that with an increase in temperature $\frac{\alpha_m}{\alpha_p} \longrightarrow 1$. It is assumed that

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The Determination of the Separation Coefficients of a Mixture of Dibutyl Phthalate and Dibutyl Azelate SOV/76-32-10-25/39

at 155° $\frac{\alpha_m}{\alpha_p}$ = 1. Data by Williams (Ref 3) were used for plotting the curves; these data were obtained in evaporations in equilibrium in the apparatus of the Otmer type at 155°. There are 6 figures, 3 tables, and 5 references, 2 of which are Soviet.

ASSOCIATION: Fiziko-khimicheskiy institut im. L. Ya.Karpova, Moskva (Physical Chemical Institute imeni L.Ya.Karpov, Moscow)

SUBMITTED: May 16, 1957

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5(4)

AUTHORS: Sakodynskiy, K. I., Babkov, S. I., Zhavoronkov, N. M., Corresponding Member, Academy of Sciences, USSR

SOV/20-121-4-30/54

TITLE: The Coefficients of the Equilibrium Distribution of Deuterium in the Isotope Exchange Between Water and Some Thiols (Koeffitsiyenty ravnovesnogo raspredeleniya deyteriya pri izotopnom obmene mezhdu vodoy i nekotorymi tiolami)

PERIODICAL: Doklady Akademii nauk SSSR, 1958, Vol 121, Nr 4, pp 681-684 (USSR)

ABSTRACT: It was interesting experimentally to determine the coefficients mentioned in the title. This paper investigates the equilibrium of the reactions of deuterium exchange between water and normal butyl thiol $n\text{-}C_4H_9SH$, secondary butyl thiol $sec\text{-}C_4H_9SH$, isoamyl thiol $iC_5H_{11}SH$, normal hexylthiol $n\text{-}C_6H_{13}SH$, and thiophenol C_6H_5SH. The experimental determination and the calculation of the coefficients α of the equilibrium distribution of deuterium are discussed. The isotope equilibrium in the exchange between water and the thiols is obtained after 8 - 10 hours at a temperature of 20°

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The Coefficients of the Equilibrium Distribution of Deuterium in the Isotope Exchange Between Water and Some Thiols

(after 2 hours after the exchange with thiophenol) and after 2 - 4 hours at 80°. In addition to the experiments concerning the direct exchange (between water enriched by deuterium and thiol of a natural deuterium concentration), for each of the investigated types of thiol one experiment concerning the inverse exchange at 20° was carried out. The results of the experimental determination of the coefficient α of the equilibrium distribution (for various temperatures) are given in a table. The corresppnding errors are then discussed. Under the discussed conditions of the isotope exchange, only the hydrogen isotopes of the group S-H participate in the reaction. The temperature dependence of α is shown in a diagram and the corresponding analytic expressions $\lg(\alpha) = f(T)$ for the various thiols are explicitly given. However, the results of this paper and also previous results are not sufficient for the finding of a direct connection between the quantity α and the composition (and the structure) of the radical group . It is only evide , that the influence of the structure and of the composit: of the radical group on the value of α is

The Coefficients of the Equilibrium Distribution of Deuterium in the Isotope Exchange Between Water and Some Thiols

weak. There are 1 figure, 1 table, and 10 references, 5 of which are Soviet.

ASSOCIATION: Fiziko-khimicheskiy institut im. L. Ya. Karpova (Physical-Chemical Institute imeni L. Ya. Karpov)

SUBMITTED: May 13, 1958

RYABENKO, A.Ya., glavnyy red.; VINOGRADOV, A.P., red.; VOL'FKOVICH, S.I., red.; ZHAVORONKOV, N.M., red.; IVANOV, M.I., red.; KISELEV, V.S., red.; LUNACHARSKAYA, I.A., red.; MEDVEDEV, S.S., red.; MEL'NIK, B.D., red.; PLANOVSKIY, A.N., red.; TOPCHIYEV, A.V., red.; ROMM, R.S., red.; POGUDKIN, P.V., tekhn.red.

[Chemical industry of the U.S.S.R.] Khimicheskaia promyshlennost' SSSR. Moskva, Gos.nauchno-tekhn.izd-vo khim.lit-ry, 1959. 457 p. (MIRA 13:4)

1. Russia (1923- U.S.S.R.) Gosudarstvennyy nauchno-tekhnicheskiy komitet.

(Chemical industries)

10(2)

AUTHORS: Zhavoronkov, N. M., Corresponding Member, AS USSR, Martynov, Yu. M., Candidate of Technical Sciences

SOV/64-59-2-12/23

TITLE: Investigation of the Kinetics of the Absorption Process of Nitrogen Oxides in Water and Aqueous Solutions of Nitric Acid (Issledovaniye kinetiki protsessa absorbtsii okislov azota vodoy i vodnymi rastvorami azotnoy kisloty)

PERIODICAL: Khimicheskaya promyshlennost', 1959, Nr 2, pp 150-155 (USSR)

ABSTRACT: In the present paper previous experiments (Ref 1) were continued. The absorption process took place in a tube (diameter 10.2 mm, length 1 m, in the case of some experiments 0.5 m and 0.3 m), which was placed in a thermostat. The liquid- and gas flow were measured by means of a rheometer. The gas phase was analyzed according to the method already described (Ref 1). Since the components which are absorbed (NO_2 or N_2O_4, N_2O_3 or $NO + NO_2$) have not yet been determined, all computations were made with respect to NO_2 and N_2O_3. It was found that the absorption process is retarded with NO_2 of relatively weak

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concentration (Fig 1) and the absorption rate depends on the NO_2-concentration and temperature. It is, however, independent of the velocity of gas flow (kinetic range) while at higher NO_2-concentrations the rate of the absorption process also depends on the velocity of gas flow (Fig 2) (hydrodynamic range). The transition from the kinetic to the hydrodynamic range takes place at a certain NO_2-concentration (different for the different flow velocity), i. e. the concentration of the dynamic equilibrium. The absorption of NO_2 in 39-57% nitric acid differs from that in water and alkaline liquids by the fact that no kinetic course of reaction can be observed and that in the concentration of a dynamic equilibrium of NO_2 (proportional to the concentration of nitric acid in which it is absorbed) the process is interrupted (Figs 8-10). If the NO_2 content in the gas exceeds considerably that of NO, mainly NO_2 is absorbed, in the reverse case N_2O_3 (or NO + NO_2)

absorption predominates. Comparative investigations showed that N_2O_3 is absorbed 1.4 times more rapidly than NO_2 (in the hydrodynamic range) under equal conditions. In water and alkaline solutions N_2O_3-absorption is directly proportional to the NO + NO_2-concentration in gas without the occurrence of kinetic absorption (Figs 11, 12). An increase of temperature from 20° to 50° reduces the rate of NO_2 and N_2O_3-absorption (in the hydrodynamic range) by 1.5 times. There are 14 figures and 9 references, 5 of which are Soviet.

5(4) SOV/156-59-2-9/48

AUTHORS: Sakodynskiy, K. I., Zhavoronkov, N. M.

TITLE: The Rate of Hydrogen Exchange Between Water and Isoamyl Thiol in an Inert Solvent (Skorost' vodorodnogo obmena mezhdu vodoy i izoamiltiolom v srede inertnogo rastvoritelya)

PERIODICAL: Nauchnyye doklady vysshey shkoly. Khimiya i khimicheskaya tekhnologiya, 1959, Nr 2, pp 256-259 (USSR)

ABSTRACT: Scarce publication data on the hydrogen exchange between the S-H- and O-H-groups (Refs 1-11) are mentioned. As the two components mentioned in the title are not soluble in one another, the rate of isotopic exchange depends to a considerable extent on the conditions of mixing of the two components (Fig 1). Therefore, the reaction in solution was investigated in an inactive medium, i.e. acetone. Though acetone enters an exchange reaction with water, this reaction is so slow (Ref 14) in the neutral medium that it was possible to neglect it for the short periods of experimenting. The degree of exchange was calculated according to the following formula: $F = (1 - \frac{x_0 - x_t}{x_0 - x_\infty}) 100\%$ (x = initial

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The Rate of Hydrogen Exchange Between Water and Isoamyl Thiol in an Inert Solvent

concentration of deuterium in water, x_τ = concentration of D according to the time τ, x_∞ = concentration of D after the state of equilibrium has been attained). A table gives the experimental results. They indicate that the exchange reaction proceeds in the inert solvent with high velocity and is finished after 0.5 min, and that the isotopic exchange does not cause side reactions. Figure 2 shows the difference of the reaction rate in the case of the mixing of the components and of solving them in an inert solvent. There are 2 figures, 1 table, and 16 references, 9 of which are Soviet.

PRESENTED BY: Kafedra tekhnologii svyazannogo azota i shchelochey Moskovskogo khimiko-tekhnologicheskogo instituta im. D. I. Mendeleyeva (Chair of the Technology of Bound Nitrogen and Alkalies of the Moscow Institute of Chemical Technology imeni D. I. Mendeleyev)

SUBMITTED: December 31, 1958

21(5) SOV/64-59-3-9/24

AUTHORS: Zhavoronkov, N. M., Sakodynskiy, K. I.

TITLE: Industrial Methods for the Production of Heavy Water (Promyshlennyye metody polucheniya tyazheloy vody)

PERIODICAL: Khimicheskaya promyshlennost', 1959, Nr 3, pp 35 - 48 (USSR)

ABSTRACT: A detailed survey is given on industrial methods of producing heavy water, stating data on the technological methods of the whole world, which are projected or have been carried out, or which are being carried out or have been dropped already. The various methods of developing and separating deuterium are theoretically dealt with, as well as the electrolysis, the chemical exchange of isotopes and the rectification of water and hydrogen, the corresponding data are given (Tables 1,2 (printing error)). Among the various factories in the western countries established for the production of heavy water, those works are mentioned which work according to the electrolytic method, the rectification of water and the distillation of hydrogen, and according to the double-temperature method, the corresponding figures are given, representations in diagrams and industrial and commercial data are shown. As far as the

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method of hydrogen distillation is regarded, it was mentioned that this was the first method to be introduced in USSR industry, deuterium was extracted from electrolytic hydrogen according to the low-temperature rectification (Ref 37). The latter production is the only example given for the production of heavy water in a country other than western and is described in detail (Fig 4, scheme). A table is also given (Table 3) with data on works and firms in western countries which deal or dealt with the production of heavy water. Finally comparisons are made between the various methods of producing heavy water, and the corresponding data are given of some works in the western countries (Tables 4,5). There are 12 figures, 5 tables, and 96 references, 6 of which are Soviet.

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SOV/184-59-4-2/18

AUTHORS: Malyusov, V.A., Candidate of Chemical Sciences; Malafeyev, N.A., Candidate of Technical Sciences; Zhavoronkov, N.M., Corresponding Member of AS USSR

TITLE: Multistage Metallic Apparatus for Molecular Distillation

PERIODICAL: Khimicheskoye mashinostroyeniye, 1959, Nr 4, pp 4 - 6 (USSR)

ABSTRACT: The article describes a 9-stage apparatus of ladder-type, suitable for molecular distillation on an industrial scale. The apparatus (Figure 1) consists of a casing 1 with rectangular cross-section. Inside the casing there is a tub 2, divided by walls into cells 60 mm long each. Condenser 4 is bent in its lower part for better flowing off of the condensate. The space between the tub and the condenser is divided into sections by means of the screens, to avoid the mixing of vapors of different concentration. The apparatus is installed at an incline of 2 - 3°, the end with the flange being in the higher position. The cells are filled with the mixture to be separated. The lower part of the condenser is filled with a heat carrier, having a boiling temperature at atmospheric pressure about 50 - 100° lower than the temperature of the evaporating mixture, but higher than the melting temperature of its components. A water-cooled unit 5 serves to condensate

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Multistage Metallic Apparatus for Molecular Distillation

the vapors of the heat carrier. When mixtures with low melting temperatures are distilled, the condenser can be cooled directly with running water, and no special cooler is needed. In the process of distillation the mixture evaporates in each cell, the vapors rise and condense on the surface of the condenser, the distillate flows to the rib of the condenser, from where it flows over into the adjacent higher cell through the trough 7. As soon as a cell is filled with the fluid, the latter flows over into the adjacent lower cell through slits in the walls separating the cells. As a result of this process of counterflow of the fluid and vapor phases, the light components concentrate in the upper part of the apparatus and the heavy components in the lower part. The apparatus was tested (I.V. Aristova, participated) with the mixture di-e-ethylhexylphthalate-di-2-ethylhexylcebacate (EGF-EGC), the temperature and the residual gas pressure being 148° and 6.10^{-3} mm Hg respectively. Each test lasted 15 hours. The average efficiency of the apparatus was 0.68, that of individual cells ranged between 0.8 in the middle part and 0.45 at the ends. The distillation rate for one cell, computed by Knudsen-Langmuir formula was approximately 300 g/hour. For industrial use the design of the apparatus can be con-

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Multistage Metallic Apparatus for Molecular Distillation

siderably simplified by leaving out some parts, needed for laboratory uses as, for instance, the inserted tub 2 and the side tester 8 (Figure 1). Figure 2 shows an apparatus of industrial type with a higher efficiency (more cells) and a higher capacity (parallel sections).
There are: 2 diagrams, 1 table and 8 references, 2 of which are Soviet and 6 English (American).

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Zhavoronkov, N. M.

5(0)

SOV/64-59-4-1/27

AUTHOR: Zhavoronkov, N. M., Deputy Chairman of the Organization Committee of the VIIIth Mendeleyev Congress, Corresponding Member of the AS USSR

TITLE: VIII. Mendeleyev Congress of General and Applied Chemistry (VIII. Mendeleyevskiy s"yezd po obshchey i prikladnoy khimii)

PERIODICAL: Khimicheskaya promyshlennost', 1959, Nr 4, pp 1-10 (USSR)

ABSTRACT: From March 16 to 23, 1959, the eighth traditional congress of Russian chemists took place in Moscow . The congress was organized by the Academy of Sciences of the USSR, by the Vsesoyuznoye khimicheskoye obshchestvo imeni D. I. Mendeleyeva (All-Union Chemical Society imeni D. I. Mendeleyev), the Gosudarstvennyy komitet Soveta Ministrov SSSR po khimii (State Committee of the Council of Ministers of the USSR of Chemistry) and by the Ministerstvo vysshego obrazovaniya SSSR (Ministry of Higher Education of the USSR). In the introduction this paper gives a detailed summary of the scientific perceptions of D. I. Mendeleyev and mentions the 7 congresses which have hitherto taken place with data on the development of the chemical industry in the USSR and some lecturing scientists of the VIIth Congress (N. N. Beketov, N. A. Umov, V. I.

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VIII. Mendeleyev Congress of General and Applied Chemistry

Vernadskiy, D. P. Konovalov, A. Ye. Favorskiy, N. S. Kurnakov, A. Ye. Fersman, N. D. Zelinskiy, L. A. Chugayev, V. Ye. Tishchenko, D. N. Pryanishnikov, A. N. Bakh, P. P. Lazarev, V. G. Khlopin, A. A. Baykov, S. I. Vavilov, N. A. Morozov, N. A. Shilov, V. A. Kistyakovskiy). In the following the present problems of the chemical industry of the USSR are discussed [illegible] and [illegible] the production of high-molecular compounds, of polymers, of biologically active compounds, the chemistry of elemental organic compounds of semiconductors and radioactive radiatons, the control of nuclear reactions (discussed on the XXIth Congress at the CPSS by Academician I. V. Kurchatov), the technology of silicates, and other problems of theoretical and applied chemistry are mentioned which were dealt with at the VIIIth Congress. In the opening speech the chairman of the Organization Committee of the VIIIth Congress, the President of the AS USSR, Academician A. N. Nesmeyanov discussed shortly the development of chemical sciences and industry in the USSR since the VIIth Congress and the main tasks of the VIIIth Congress. In the first plenary meeting a contribution of the Chairman of the State Committee of the Council of Ministers of the USSR of Chemistry V. S.

VIII. Mendeleyev Congress of General and Applied Chemistry

Fedorov was given about the "Problems of Scientific Technical Progress of the Chemical Industry" and by the Academician V. A. Kargin on the "Fundamental Problems of the Polymer Chemistry". In the plenary meetings the following contributions were given: Academician A. N. Nesmeyanov "The Periodic System of the Elements of D. I. Mendeleyev and Organic Chemistry", Academician N. N. Semenov - " Fundamental Problems of Chemical Kinetics", Academician V. I. Spitsyn -"Modern State of the Periodic System of D. I. Mendeleyev", Academician A. P. Vinogradov - "Fundamental Problems of Radiochemistry", Academician V. A. Engel'gardt - "Fundamental Problems of Biochemistry", Professor A. V. Sokolov - "Chemical Problems of the Agriculture of the USSR", Director of the Nauchno-issledovatel'skiy institut khimicheskogo mashinostroyeniya (Scientific Research Institute of Chemical Machine Construction) V. V. Nikolayev - "Main Problems of the Chemical Apparatus and Machine Construction", Corresponding Member of the AS USSR Ya. K. Syrkin - "Present State of the Problem of Valence" and Academician A. P. Aleksandrov - "Chemical Aspects in the Application of Atomic Energy". 17 sections and 9 subsections worked on the Congress. 1500 delegates among

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VIII. Mendeleyev Congress of General and Applied Chemistry

them 700 guests from 19 countries (150 scientists) attended the Conference. In the opening session the Chairman of the Vsekitayskogo khimicheskogo obshchestva (All-Chinese Chemical Society) the Rector of the Nankayskiy universitet (University Nanking) Yang Shih-hsiang made a speech and at the final session the Professor of the University of Sofia-Dimitr Ivanov. The foreign scientists made approximately 60 contributions among them the following:Liu Ta-kang, Director of the Institute of Chemistry of the Academy of Sciences of the Chinese People's Republic - "State of the Studies on Rare Elements in the Chinese People's Republic", K.Nenintsescu, Rumanian scientist, Academician - "Separation of the Complex of Cyclobutadiene With Silver Nitrate", Academician I. Murgulescu -"Kinetics of the Dehydration of the Crystal Hydrates", and Academician R. Ripan - "Investigation of the Structure of Some Inorganic Compounds by Means of Radioactive Isotopes", Academician Geza Shay, President of the Hungarian Chemical Society - "Quantitative Ratio in Frontal Gas Chromatography", K. K. Ingold, Professor of the London University - "Nitration With Respect to Nitrogen and Oxygen", R. P. Bell, President of the Faraday Society and Professor at Oxford University - "The

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VIII.Mendeleyev Congress of General and Applied Chemistry

Tunnel Effect in Reactions With the Action of Hydrogen Isotopes" (H. K. Ingol d made a lecture in Leningrad on the theme "Studies of the Kinetics of the Nitration Process", requested by Russian scientists), H. Nowotny, Professor of the Vienna Technical University - "Crystallochemistry of the Carbides and Silicides of Hafnium and Uranium", of the plenipotentiary for the organization of scientific research work at the French Prime Minister's office, Professor P'yer Pigan'ol' "Rheological Properties of Molten Polymers; and "Organization of Scientific Research Work in France", Charl' Prevo, President of the Chemical Society of France - "Mesomechanism and Circular Displacement of Electrons", T. Sherwood, Professor of Massachusetts Institute of Technology - "New Theory of Mass Transfer Effected by a Chemical Reaction", S. Uinshteyn, Professor of California University in Los Angeles - "On the Brine Effects and Ionic Vapor in Solvolysis". The discussions of S.Thompson and A. Giorso, Professors of California University in Berkeley and their lectures on the investigations of the transuranium elements, [illegible] the chair of G. Seaborg met with lively interest. Furthermore, the following foreign scientists participated actively at the Con-

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gress: Viktor Kemulya, Bogdan Kamensky , Corresponding Members of the Polish Academy of Sciences, and Professor Aleksandr Zmachinsky , Deputy Chairman of the Society of Engineers and Technicians of the Chemical Industry of the Polish People's Republic, Li Sin Gi, Academician of the Korean Democratic People's Republic (with a lecture on the synthetic fiber production), Erich Tilo, Director of the Institute of Inorganic Chemistry of the Academy of Sciences in Berlin (with the contribution "On Studies in the Field of Polyphosphates"), the Nobel prize-winner Walter Noddack, Professor Ida Noddack, G. Wittig, Professor of Heidelberg University, the Dutch scientist Kh. R. Kroyt, the Vice-president of the French Chemical Society A. Norman, Božo Težak , Professor of Zagreb University, D. Semerano, Professor of Padua University, Professor Yuro Horiuchi, Director of the Institute of Catalysis in Sapporo (Japan). Moreover the representatives of the International Congress of Pure and Applied Chemistry - President A. Schtoll (Switzerland), the Secretary General R. Morf (Switzerland) and Members of the Executive Committee V. Klemm (GFR), M. Letor (France), attended the Conference. The VIII. Mendeleyev Congress of General and Applied Chemistry took place under the motto "view into the future". There is 1 figure.

ZHAVORONKOV, N.M.; BABIKOV, S.I.; ORLOV, V.Yu., kand.khimicheskikh nauk; SAKODYNSKIY, K.I., kand.khimicheskikh nauk; SEVRYUGOVA, N.N.; SOKOL'SKIY, V.A.; CHERNYKH, G.N.

Production and uses of steble isotopes. Khim.nauka i prom. 4 no.4:487-498 '59. (MIRA 13:8)
(Isotope separation)
(Isotopes--Industrial applications)

5(0)

AUTHORS: Vol'fkovich, S. I., Academician SOV/30-59-5-35/43
Zhavoronkov, N. M., Corresponding Member, Academy of Sciences, USSR

TITLE: At the American Congress of Chemical Engineers (Na amerikanskom kongresse inzhenerov-khimikov)

PERIODICAL: Vestnik Akademii nauk SSSR, 1959, Nr 5, pp 119-125 (USSR)

ABSTRACT: The American Society of Chemical Engineers, upon whose invitation the authors of the present paper paid a visit to the USA, celebrated the 50th anniversary of their foundation last year. The Jubilee Congress of the Society was held in Philadelphia (USA) from June 22 to 27, 1958, with the participation of about 2,000 persons, among whom were 102 delegates of other countries. In the 22 scientific-technical sections more than 90 lectures were delivered concerning various problems of chemical technology, economy, organization of production and chemical engineering training. Brief outlines of most part of the lectures were distributed among the participants. The authors of this mention a great number of lectures, all of which were by American scientists, and they state that some of chemical engineers in the USA

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are working in atomic research at present. The authors stress the friendly attitude and the hospitality offered to the Soviet delegates by the heads of the organizational c[illegible]ittee and by many US scientists. In many speeches and lectu[illegible], American scientists and leading personalities of the chemical industry mentioned the rapid development and the success achieved by science, technology and higher education in the USSR. Although to a limited extent, the authors were offered the possibility of participating in excursions to some scientific research institutes and to industrial enterprises. The visit paid to a scientific research laboratory for the chemical technology of mineral fertilizers is recalled as having been of special interest, and the very extensive use of liquid fertilizers made in the USA is pointed out. Mention is also made of the factory "Plastics and Coal Chemical Division" concerned with the processing of pit coal, bitumen, and organic synthesis, and it is stated that the procedure introduced a short time ago in the above factory for the production of phenol and acetone does essentially differ from the one worked out very much in the USSR by P. G. Sergeyev and his co-workers. Th emphasized in conclusion, that the

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At the American Congress of Chemical Engineers SOV/30-59-5-35/43

Soviet delegates were given the possibility of getting acquainted with some achievements of American chemical engineering and of entering in personal contact with American scientists and industrial representatives, whose great hospitality is mentioned again. At a press conference in Philadelphia and during a lunch with the professors of the Massachusetts Technological Institute the USSR delegates explained some achievements of Soviet Chemistry and answered questions concerning the development of the chemical industry and the organization of chemical higher education in the USSR. The hope is expressed that this exchange of opinions may serve to consolidate the friendly relations and the exchange of scientific achievements in the field of chemistry between the two countries.

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ZHAVORONKOV, N. M.

Chemistry in the seven-year plan. Izobr.i rats. no.7:6-9 Jl '59. (MIRA 12:11)

1. Chlen-korrespondent Akademii nauk SSSR.
(Chemistry, Technical)

MALYUSOV, V.A.; MALOFEYEV, N.A.; ZHAVORONKOV, N.M.; Prinimala uchastiye ARISTOVA, I.V.

Some methods used for increasing the effectiveness of centrifugal molecular stills. Khim.prom. no.8:695-699 D '59. (MIRA 13:6)
(Distillation apparatus)

ZHAVORONKOV, N.M.

Results of the Eighth Mendeleev Congress. Vest. AN SSSR 29 no.6:26-34 Je '59. (MIRA 12:5)

1. Chlen-korrespondt AN SSSR.
(Chemistry--Congresses)

21(5) SOV/20-125-3-32/63

AUTHORS: Matveyev, K. I., Uvarov, O. V., Zhavoronkov, N. M., Corresponding Member, AS USSR

TITLE: The Coefficients of the Separation of Chlorine Isotopes in the Equilibrium Evaporation of HCl (Koeffitsiyenty razdeleniya izotopov khlora pri ravnovesnom isparenii HCl)

PERIODICAL: Doklady Akademii nauk SSSR, 1959, Vol 125, Nr 3, pp 580-583 (USSR)

ABSTRACT: The authors determined the influence exerted by the amount of impurities upon the value of the coefficient of separation. The computation was made in a provisional manner according to Rayleigh's equation. A diagram illustrates the results, i.e. the coefficient of separation as a function of the coefficient of enrichment F and of the degree of concentration. The liquid hydrochloric acid was evaporated out of a cylindrical vessel with conical bottom. Two figures illustrate this vessel which was contained in a vacuum jacket, as well as the scheme of the whole evaporator. The experimental conditions are listed, and the experimental results are shown in the following table:

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The Coefficients of the Separation of Chlorine Isotopes in the Equilibrium Evaporation of HCl

T	P	F	$\alpha_{experimental}$	$\alpha_{computed}$
167	190	1.0221	1.0022±0.00025	1.0022
173	285	1.017	1.00193±0.000125	1.00194
181	534	1.012	1.0014±0.0001	1.0016
185	—			1.0014
189	760			1.0013

The temperature dependence of ln α is expressed by the equation $\ln \alpha = \frac{1.2846}{T} - 0.0055$, where T denotes the absolute zero. The resultant small value of α (at the normal boiling temperature of 1.0013) indicates that it is not advisable to employ the rectification of HCl for the purpose of separating chlorine

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The Coefficients of the Separation of Chlorine Isotopes in the Equilibrium Evaporation of HCl

isotopes, not even in the presence of columns with a high degree of efficiency. There are 3 figures, 1 table, and 9 references, 5 of which are Soviet.

ASSOCIATION: Nauchno-issledovatel'skiy fiziko-khimicheskiy institut im. L. Ya. Karpova (Physico-chemical Scientific Research Institute imeni L. Ya. Karpov)

SUBMITTED: December 10, 1958

5(2), 21 (5)

AUTHORS: Sevryugova, N. N., Uvarov, O. V., Zhavoronkov, N. M., Corresponding Member AS USSR

SOV/20-126-5-36/69

TITLE: Separation of Boron Isotopes by Boron Chloride Rectification (Razdeleniye izotopov bora rektifikatsiyey khloristogo bora)

PERIODICAL: Doklady Akademii nauk SSSR, 1959, Vol 126, Nr 5, pp 1044 - 1046 (USSR)

ABSTRACT: At the beginning, the differences between the two boron isotopes B^{10} and B^{11} are indicated (Ref 1). The light isotope B^{10} is used for filling neutron counters; besides, it can be used as a protection against neutron radiation, and for regulating the operation of reactors. The separation of boron isotopes is achieved by 5 different methods: a) electromagnetically, b) by thermodiffusion, c) by means of diffusion by vapor, d) by the chemical isotope exchange, and e) by rectification. The methods a) and c) make possible a high degree of separation, but are little productive. The method b) failed. At present, the two latter methods d) and e) can be regarded as most convenient for the B^{10}-production. Both of them have been chemically developed.

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Separation of Boron Isotopes by Boron Chloride Rectification SOV/20-126-5-36/69

The authors think that rectification is one of the most economical methods. They carried out the rectification of the BCl_3 in columns of various types of construction (Fig 1). The procedure is described in detail. Figure 2 shows the course of the increase in $B^{10}Cl_3$ in the retort liquid. Within 28 days, a 5-fold enrichment was obtained at a content of 100 cm^3 liquid in the distillation vessel. The stationary phase was not attained during the period mentioned. The calculation showed that the (maximum possible) separability of the column is equal to 800 theoretical steps. This should guarantee the obtaining of a product with a content of about 75 Mol-% $B^{10}Cl_3$. An approximate calculation showed that the production method for elementary boron described here is acceptable from an economical point of view. There are 2 figures and 5 references, 4 of which are Soviet.

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Separation of Boron Isotopes by Boron Chloride Rectification SOV/20-126-5-36/69

ASSOCIATION: Nauchno-issledovatel'skiy fiziko-khimicheskiy institut im. L. Ya. Karpova (Scientific Physico-chemical Research Institute imeni L. Ya. Karpov)

SUBMITTED: September 5, 1958

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66496

~~5(4), 24(1)~~ 5.1105, 24.1200 SOV/20-129-1-44/64

AUTHORS: Orlov, V. Yu., Zhavoronkov, N. M., Corresponding Member, AS USSR

TITLE: The Effect of Ultrasonics on the Absorption of Carbonic Acid Gas by Water

PERIODICAL: Doklady Akademii nauk SSSR, 1959, Vol 129, Nr 1, pp 161-164 (USSR)

ABSTRACT: Preliminary experiments showed that the absorption of CO_2 in H_2O is increased considerably by ultrasonics. To obtain an exact understanding of the existing relationships an apparatus was constructed (Figs 1,2) in which a film of water, in countercurrent to CO_2, flowed through a barium titanate cylinder used as sound transmitter. Generators of types UZG, GU-3, and RFT-602 were applied. Frequency measurements were carried out by means of the oscillograph type EO-7, and the generator type GSS-6. The barium titanate cylinders (Table 1) were made partly at the Gosudarstvennyy elektrokeramicheskiy institut (State Institute of Electroceramics) and partly at the Akusticheskiy institut AN SSSR (Institute of Acoustics AS USSR). Table 2 gives the values for C/C_p (= CO_2-content obtained, C_p = equilibrium con-

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The Effect of Ultrasonics on the Absorption of Carbonic Acid Gas by Water

contration at the respective temperature). Experimental data are given in table 3. Formation of circular waves (wave intervals about 3 mm at 800 kilocycles and about 1 mm at 100 kilocycles) and cavitation were observed. The dependence of the rate of absorption on the ultrasonic frequency is shown in figure 3. 50 kilocycles proved the most effective (CO_2-concentration raised 4-fold), whereas both 800 and 100 kilocycles raised the CO_2-concentration only 2 1/2-fold. An increase in the intensity of the ultrasonic waves above 2 - 3 w/cm^2 led to partial drying up of the water film. R. A. Ivanova took part in the experiments. The authors thank B. I. Konobeyev for criticism of the paper. There are 3 figures, 3 tables, and 3 references, 2 of which are Soviet.

ASSOCIATION: Nauchno-issledovatel'skiy fiziko-khimicheskiy institut im. L. Ya. Karpova (Scientific Research Institute of Physical Chemistry imeni L. [illegible] Karpov)

SUBMITTED: July 6, 1959

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ZHAVORONKOV, N.M.; RAMM, V.M., kand.tekhn.nauk; GIL'DENBLAT, I.A., inzh.; ZAKGEYM, A.Yu., inzh.

Relationship between the number of irrigating streams and the effectiveness of absorption in packed towers. Khim.mash. no.1: 21-24 Ja '60. (MIRA 13:5)

1. Chlen-korrespondent AN SSSR (for Zhavoronkov).
(Packed towers)

0.0000

77230
SOV/89-8-1-24/29

AUTHOR: Zhavoronkov, N. M., and Sakodynsky, K. I.

TITLE: Scientific and Technical News. At the Institute of Physical Methods of Separation (German Democratic Republic)

PERIODICAL: Atomnaya energiya, 1960, Nr 1, pp 81-82 (USSR)

ABSTRACT: In September of 1959, through an invitation by the German Academy of Sciences in Berlin, the authors of this article visited the Institute of Physical Methods (headed by J. Muhlenfordt) in the city of Leipzig. It is the center, in the German Democratic Republic, of experimental work on the stable isotopes. The Institute was organized in 1955. Its basic requirement is the expansion of research and cooperation on the use of stable isotopes among the scientific and other related organizations. The Institute does a great deal of work on the application of the stable isotopes to chemistry, biology, medicine, geology, etc.; it also develops the methods of working with the stable isotopes and works on the theory of separation

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Scientific and Technical News. At the Institute of Physical Methods of Separation (German Democratic Republic)

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processes. There are six departments in the Institute: (1) the experimental separation through rectification, headed by E. Kröll; (2) the experimental separation through the chemical exchange, headed by K. Wetzel; (3) the theory of separation methods, headed by G. Fogt; (4) the theoretical, headed by G. Voigt; (5) the analytic, headed by G. Birkenfeld; and (6) the application of stable isotopes, headed by H. Hübner. All the above departments are involved in production of stable isotope concentrates of hydrogen, boron, carbon, nitrogen, and oxygen. Construction is scheduled of the new powerful units for an expanded production of stable isotopes and the concentrates B^{O} by a method of the exchange distillation between BF_3 and its groupings with anisole. Besides fulfilling its own requirements, the Institute performs the isotope analysis for all related organizations in the German Democratic Republic.

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S/064/60/000/02/15/025
B022/B005

AUTHORS: Malyusov, V. A., Malafeyev, N. A., Zhavoronkov, N. M.

TITLE: Thin-layer Rectification of the Mixture Styrene - Ethyl Benzene

PERIODICAL: Khimicheskaya promyshlennost', 1960, No. 2, pp. 153 - 157

TEXT: The separation of the mixture styrene - ethyl benzene under industrial conditions is carried out in plate columns under high vacuum; difficulties arise, however, due to polymerization of styrene which occurs under these conditions in spite of all countermeasures. An attempt was made to improve the conditions by using columns with packings of irregularly shaped bodies instead of the plate column because the former show a lower hydraulic resistance than the latter. It must be assumed, however, that in thin-layer rectification in columns with regularly shaped caps a considerable reduction of temperature and a suppression of polymerization in the lower part of the colum will be possible. The distribution coefficient α in the system [illegible] investigated, and the phase equilibrium conditions are measured ($T_{[illegible]}$). Fig. 1 shows the dependence of the

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distribution coefficient α on the concentration of ethyl benzene in the liquid at different pressures. Fig. 2 shows the equilibrium curve for the system styrene - ethyl benzene at different pressures. The mass transfer on rectification in the film is investigated by means of a device the diagram of which is shown in Fig. 3. The height h, which is equivalent to the theoretical plate number, is computed by equation (1). Table 2 shows the dependence of the height equivalent to the theoretical plate (HETP) and of the height of the mass transfer unit computed by equation (2) on the density of spraying. Fig. 4 shows the dependence of HETP on the density of spraying. Equation (3) was derived for the laminar current of vapors. Fig. 5 shows a comparison of the experimental results with the results obtained from equation (3) in the case of laminar vapor current. Table 3 contains data on the dependence of HETP on pressure, Fig. 6 shows a comparison of experimental results with the results of equation (4) obtained for turbulent vapor currents, and Fig. 7 the dependence of HETP on pressure in the form of a diagram. V. B. Fal'kovskiy is mentioned. There are 7 figures, 3 tables, and 12 references: 7 Soviet and 5 American.

ZHAVORONKOV, N.M.; GIL'DENBLAT, I.A., inzh.; RAMM, V.M., kand.tekhn.nauk

Amount of liquid retained by packings in absorption columns.
Khim.mash. no.5:13-16 S-O '60. (MIRA 13:9)

1. Chlen-korrespondent Akademii nauk SSSR (for Zhavoronkov).
(Packed towers)

S/064/60/000/006/008/011
B020/B054

AUTHORS: Malafeyev, N. A., Malyusov, V. A., and Zhavoronkov, N. M.

TITLE: Study of the Process of Azeotropic Distillation of a Styrene - Ethyl Benzene Mixture

PERIODICAL: Khimicheskaya promyshlennost', 1960, No. 6, pp. 54-58

TEXT: The authors studied the effect of some substances as tertiary components in the azeotropic distillation of styrene - ethyl benzene mixtures, and determined the dependence of the composition of ethyl benzene azeotropes with the third component on pressure (or the corresponding temperature), as well as the periodic distillation of the styrene - ethyl benzene mixture with n-propyl alcohol. Tertiary components used were acetic acid, diethyl carbinol, n-propyl-, isobutyl-, and isoamyl alcohol, all of which form azeotropes with ethyl benzene and (except for diethyl carbinol), at atmospheric pressure, also with styrene; the boiling points of these azeotropes are, however, higher than those of ethyl benzene azeotropes. The apparatus used for the azeotropic distillation of the styrene - ethyl benzene mixture consisted of a rectifying column, a

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Study of the Process of Azeotropic Distillation of a Styrene - Ethyl Benzene Mixture

S/064/60/000/006/008/011
B020/B054

boiler, a condenser, a water-jet pump, and a graduated test glass to collect the distillate. The binary mixture styrene - ethyl benzene and the ternary mixtures styrene - ethyl benzene - third component were rectified with this apparatus. Styrene losses in the intermediate fractions were calculated on the basis of experimental results; the losses were smallest with the use of n-propyl alcohol and diethyl carbinol. In connection with the extraction of the third component, the authors studied the effect of pressure between 15 and 760 torr on the composition of the azeotropes ethyl benzene - third component. Table 2 gives the results of rectification of a mixture of ethyl benzene - acetic acid at a pressure of 100 torr. Fig. 2 graphically shows the temperature dependence of the composition of azeotropes of ethyl benzene with acetic acid, isobutyl-, n-butyl-, and n-propyl alcohol. Fig. 3 shows the dependence of the vapor pressure of $1000/(t + 230)$ for the azeotrope of ethyl benzene and n-propyl alcohol and the pure components. Table 3 gives the calculated pressure ranges in which the azeotropes investigated are stable, as well as their upper temperature limi[illegible] The azeotrope of ethyl benzene with acetic acid is stable at almost [illegible]ressure; the next best-suited is n-propyl alcohol since its a[illegible] with ethyl benzene decomposes at

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about 1.3 atm. Fig. 4 shows the change of boiling point and refractive index of the individual fractions as dependent on the total amount of distillate. The results of distillation were used to calculate the styrene losses in the intermediate fractions with a styrene content of from 5 to 95%. With the use of n-propyl alcohol as third component in the azeotropic distillation, the separating efficiency increases as compared with the distillation of the binary mixture styrene - ethyl benzene. Further investigations will be necessary to clarify the convenience of an azeotropic distillation of the mixture styrene - ethyl benzene with n-propyl alcohol as third component instead of the distillation of the binary mixture styrene - ethyl benzene. There are 5 figures, 4 tables, and 9 references: 2 Soviet, 6 US, and 1 British.

MALAFEYEV, N.A.; MALYUSOV, V.A.; ZHAVORONKOV, N.M.

Process of the azeotropic distillation of a styrene - ethylbenzene mixture. Khim. prom. no. 6:492-496 S '60. (MIRA 13:11)

(Styrene) (Benzene) (Distillation)

5.5010

69670

S/153/60/003/01/024/058
B011/B005

AUTHORS: Gil'denblat, I. A., Zhavoronkov, N. M.

TITLE: Spectrophotometric Determination of Naphthalene in the Gaseous Phase

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy. Khimiya i khimicheskaya tekhnologiya, 1960, Vol 3, Nr 1, pp 92-95 (USSR)

TEXT: The authors proved in their paper the efficiency of UF spectroscopy by the example of quantitative determination of small amounts of naphthalene vapor mixed with air. They examined the hitherto insufficiently studied spectrum of naphthalene vapor by an SF-4 spectrophotometer. The authors used sublimated naphthalene of the "pro analysi" type. Two methods were used to record the spectrum and to carry out calibration measurements: 1) Some naphthalene crystals were evaporated in the cuvette, 2) air saturated with naphthalene vapor was led through the cuvette. In both cases, the temperature was kept constant, and the optical density was measured. Both methods yielded the same results. Figure 1 shows spectra of naphthalene vapor saturated at 2 temperatures. The absorption peaks can be best used for the quantitative analysis. Figure 1 also shows that the section of maximum absorption lies in the shortest wave range of the spectrum. This section obviously corresponds to the 3rd line group of naphthalene. It is known from its solutions but has not at all been investigated with respect to the

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Spectrophotometric Determination of Naphthalene in the Gaseous Phase

vapor. But this very line group can be best used for determining very small naphthalene amounts. Therefore, the authors plotted the spectrum of saturated vapor in the range of 207 - 223 mμ at several temperatures (Fig 2). They had to establish experimentally the temperature dependence of vapor pressure of naphthalene (between 16 and 50°) since published data are quite contradictory. This was performed by the dynamic method of saturation of the air jet by gravimetric determination of the sublimated naphthalene quantity. An equation which see was derived from the results evaluated. It was used together with the measurement data of optical density. Figures 3 and 4 show the dependence of optic density on the naphthalene concentration in the gas phase (expressed in torr) for several wave lengths which correspond to the absorption peaks (length of cuvette 100 and 30 mm, respectively). The curves determined represent the quantitative basis for the determination of naphthalene in the gas mixture. The curves in figure 3 are better suited for relatively high naphthalene concentrations, those in figure 4 for a very low naphthalene content. Finally, the authors state that the determination of even very small quantities of one component in the gas mixture is possible without very complicated measuring apparatus (Ref 8). The student A. S. Furmanov took part in the investigation.

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69670

Spectrophotometric Determination of Naphthalene in the Gaseous Phase

S/153/60/003/01/024/058
B011/B005

There are 4 figures and 8 references, 1 of which is Soviet.

ASSOCIATION: Moskovskiy khimiko-tekhnologicheskiy institut im. D. I. Mendeleyeva; Kafedra tekhnologii neorganicheskikh veshchestv (Moscow Institute of Chemical Technology imeni D. I. Mendeleyev; Chair of Technology of Inorganic Substances)

SUBMITTED: April 9, 1959

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84218

S/078/60/005/010/017/021
B004/B067

11.4100

AUTHORS: Malafeyev, N. A., Malyusov, V. A., Zhavoronkov, N. M.

TITLE: Partition Coefficient of Potassium - Sodium Mixtures on Evaporation in High Vacuum

PERIODICAL: Zhurnal neorganicheskoy khimii, 1960, Vol. 5, No. 10, pp. 2342-2345

TEXT: In earlier papers (Refs. 1,2), the authors studied the temperature dependence of the partition coefficient in organic binary mixtures for the following cases: 1) partition coefficient α_p on evaporation under equilibrium conditions in sealed vessels; 2) partition coefficient α_M on evaporation under non-equilibrium conditions (on condensation), with the mean free path λ of the vapor molecules being longer than the distance, h, between vaporizer and condenser; 3) the cases for $\lambda < h$. The authors found that at $h/\lambda \simeq 100 - 150$ the coefficients α_p and α_M become equal. In the present paper, they report on the determination of the partition coefficient on evaporating a mixture of potassium and

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sodium. Fig. 1 shows the evaporation apparatus constructed from ЭЯ-1-Т (EYa-1-T) stainless steel, Fig. 2 shows the scheme of the entire unit with ВН-461-М (VN-461-M) forepump and ЦВЛ-100 (TsVL-100) diffusion oil pump. The experiments were made at 275 - 370°C and 2.10^{-3} - 8.10^{-3} torr. In the samples taken from the condenser, potassium was determined to be perchlorate from alcoholic solution. The partition coefficients obtained for the various temperatures are given in a Table. Fig. 3 shows $\alpha = f(t°C)$ and compares the experimental results with the theoretical curves for α_p and α_M calculated according to Ref. 4. For the sodium vapor-molecules, the mean free path λ was determined from equation

$\lambda = 1/\sqrt{2}\pi n \delta^2$ (n - number of molecules per unit volume, δ - diameter of the molecule). λ was 1.56 cm at 275°C, 0.61 cm at 300°C, and 0.115 cm at 350°C. Hence, the following values were obtained for h/λ : 4.5, 11.5, and 61. Since they were between 1 and 100-150, the curve $\alpha = f(t)$ was between the curves for α_p and α_M, which corresponds to the theoretical conditions. The authors mention G. V. Kistyakovskiy. I. V. Aristova took part in the experimental work. There are 3 figures, 1 table, and 10 references: 3 Soviet, 3 US, 1 British, and German.

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